



First record of the banjo catfish *Bunocephalus doriae* Boulenger 1902 (Siluriformes: Aspredinidae) in the Bermejo River basin, Salta, Argentina

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Abstract: Intense sampling in the upper Bermejo River basin revealed the presence of specimens of the aspredinid genus *Bunocephalus*. After detailed morphological and morphometric analyses specimens were identified as *Bunocephalus doriae*. This is the first record of any member of the Aspredinidae in the upper Bermejo River basin.

Key words: Yungas; wide distribution; Ostariophysi; population

Aspredinidae includes small Siluriformes with variably depressed bodies, that have been compared with the shape of a banjo. *Bunocephalus* is the genus with the highest number of valid species within the family, 13 spp. according to Carvalho et al. (2015). In Argentina, the family is represented by five genera and seven species, with *Bunocephalus doriae* Boulenger 1902 as the single reported species of its genus (Mirande and Koerber 2015). *Bunocephalus doriae* was described based on specimens from the Paraguay River basin in Villa Rica, Paraguay, and from the Paraná River basin in Misiones, Argentina. Currently, the species is known to be present in Southern Brazil, Paraguay, Uruguay, and Argentina (Ferraris 2007; Cardoso 2010; Serra et al. 2014; Almirón et al. 2015). In Argentina, *B. doriae* was recorded only in the main Paraguay and Paraná rivers and the lower reaches of their tributaries (Liotta 2015).

The Bermejo River runs east from northwestern Argentina and southwestern Bolivia, until its confluence with the Paraguay River in Formosa Province, northern Argentina. Therefore, most of the fish fauna from the lower Bermejo River is shared with the Paraguay and Paraná basins, although the upper Bermejo basin has several endemic species (Mirande and Aguilera 2009).

Nonetheless, rivers in northwestern Argentina usually have lower fish diversity compared to the Paraná basin. Hales and Petry (2015) considered that the lower Paraná basin, including Uruguay, Paraguay, and Argentina, hosts 340 fish species, while in the Chaco region, including Bolivia, Brazil, Paraguay, and Argentina, approximately 150 fish species were recorded. However, Mirande and Aguilera (2009) cited almost 130 species of fishes, including 11 endemics, for the Yungas (cloud rainforests) of northwestern Argentina. Therefore the number of species mentioned by Hales and Petry (2015) may be underestimated.

The aim of this contribution is to report the presence of *Bunocephalus doriae* in the upper Bermejo River basin, northwestern Argentina. This is also the first record of any aspredinid for the upper Bermejo River basin.

Specimens were collected by hand net, under permit Res. 335/15 and 594/15, issued by Secretaría de Ambiente of Salta Province.

Morphometric measurements were taken following Cardoso et al. (2015), as straight lines between points, using calipers to nearest 0.1 mm and expressed as percentages of standard length (SL) and head length (HL). Vertebral counts were done in cleared and stained specimens (C&S) and include all vertebrae (including the first five vertebrae modified as the Weberian apparatus and complex vertebra). Fishes were deposited at the Ichthyological collection of Fundación Miguel Lillo (CI-FML).

Institutional abbreviation: BMNH, British Museum of Natural History, Natural History Museum, London.

Material examined: CI-FML7094, 1 ex., 36.2 mm SL, Arroyo Aguas Lindas, Bermejo River basin, Salta, Argentina, 23°00'53.3" S 064°21'53.8" W, May 2015, Mirande, Alonso and Terán. CI-FML 7095, 16 ex. (5 C&S), 56.3–66.9 mm SL, unnamed river, Bermejo River

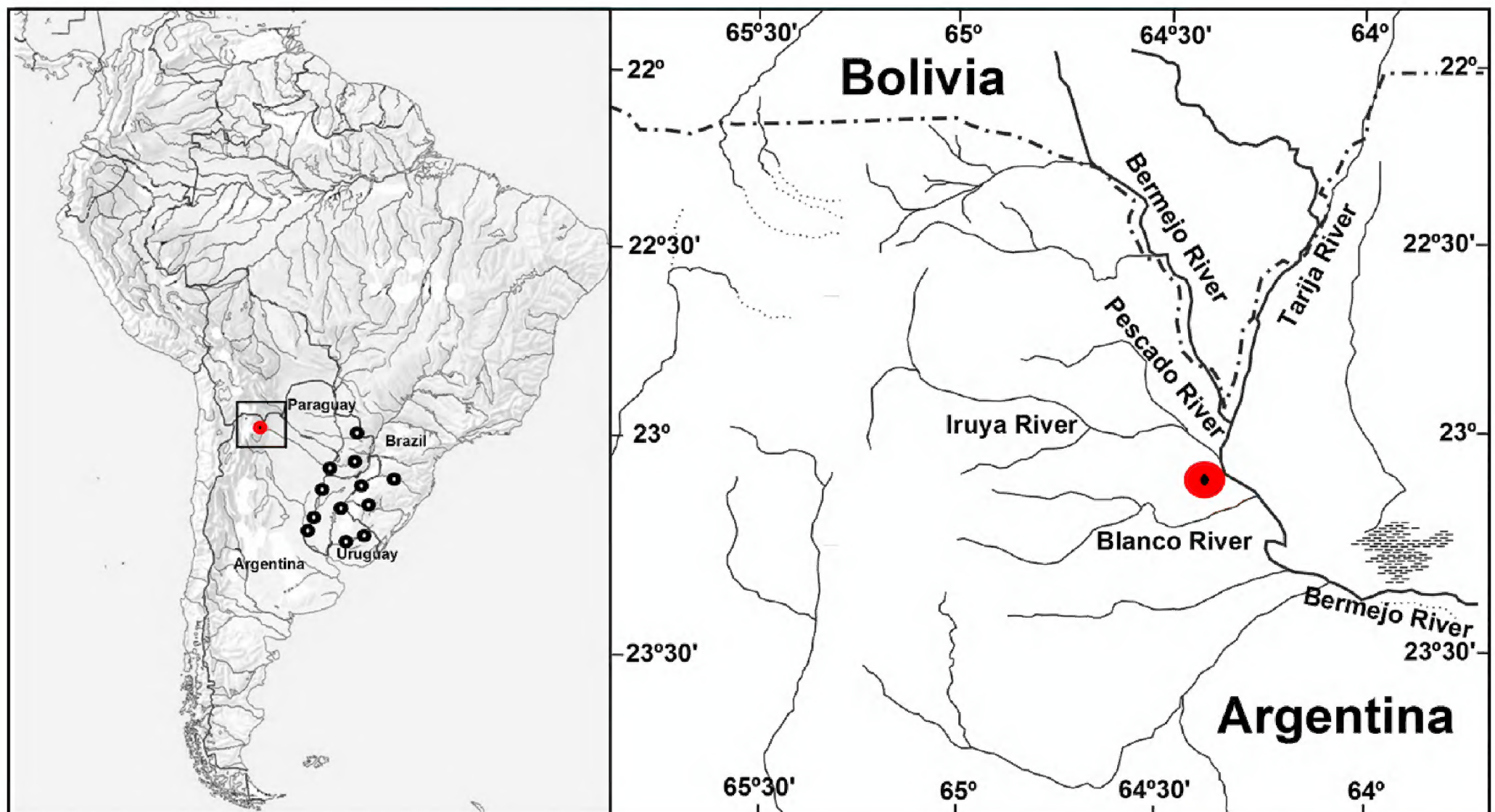


Figure 1. Distribution range of *Bunocephalus doriae*. Black dots represent the localities known so far (Ferraris 2007; Cardozo 2010; Serra et al. 2014; Almirón et al. 2015) and the red dot indicates the new record for the species herein added.

basin, Salta, Argentina, 23°01'33.2" S 064°21'37.1" W, October 2015, Mirande, Aguilera, Alonso and Terán.

The specimens collected in the Bermejo River basin fit the diagnosis of *Bunocephalus doriae*: the maxillary barbel reaches the midpoint of the adpressed pectoral-fin spine; the pectoral-fin spine is slightly curved and bears strong *serrae* on the inner and outer borders; and the coloration pattern is similar to that of the original description of *B. doriae*. Additionally, Cardoso (2010) described several osteological characters of this species, such as the tip of the fifth vertebral parapophyses not expanded, the metapterygoid elongate (its width less than half its depth), the narrow epiphyseal bar formed by the frontals, and the presence of 34 to 35 vertebrae, all of which are shared by the specimens from the Bermejo River basin, allowing us to confirm the presence of *B. doriae* in this basin (Figure 1). Morphometric measurements of *Bunocephalus doriae* (Figure 2) from the Bermejo River basin are presented in Table 1.

Meristics: Dorsal-fin rays i, 4 (10 ex.); anal-fin rays ii, 5 (2 ex.), ii, 6 (6 ex.) and ii, 7 (2 ex.); pectoral-fin rays I, 5 (10 ex.); pelvic-fin rays i, 5 (10 ex.). Vertebrae 34 (5 ex. C&S).

Bunocephalus doriae was described more than a century ago by Boulenger (1902). Eigenmann and Allen (1942), in the description of *B. retropinnis*, a junior synonym of *B. doriae* according to Friel (2003), provided additional information to distinguish this species from other members of the genus. Despite the available data, the identification of *B. doriae* based on those descriptions

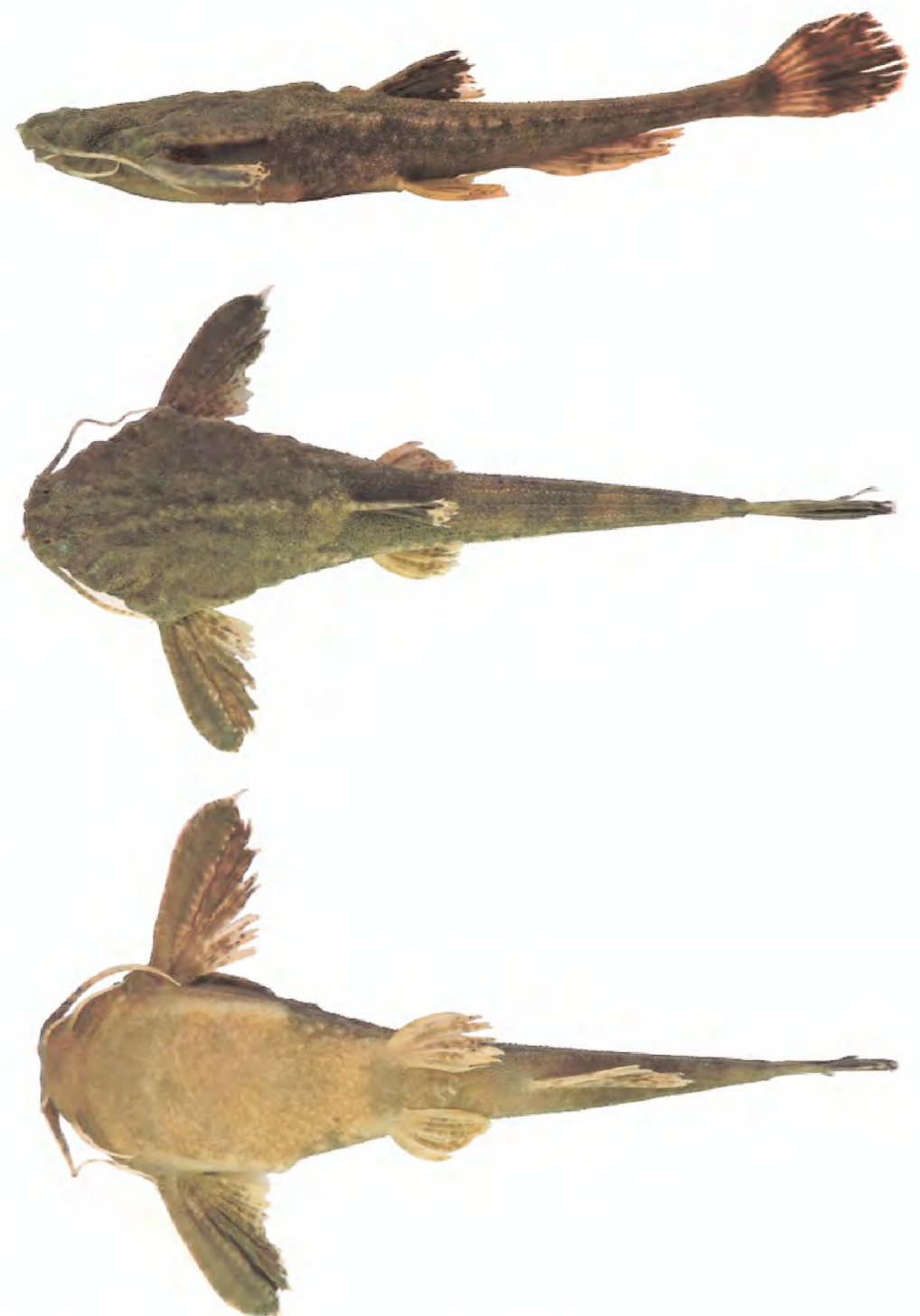


Figure 2. *Bunocephalus doriae*, CI-FML 7095, 66.1 mm SL, from Bermejo River basin.

Table 1. Morphometric measurements of *Bunocephalus doriae* from unnamed creek, Bermejo River basin, Salta, Argentina; $n = 10$.

	Range	Mean	S.D.
Standard length	56.3-66.9	61.8	3.0
Percent of SL			
Head length	21.9-24.5	22.9	0.7
Pre-pectoral length	21.4-25.3	22.6	1.2
Cleithral width	29.1-33.7	30.8	1.4
Maximum head depth	14.0-16.6	15.4	0.8
Pectoral-spine length	21.1-28.3	23.4	2.0
Distance between coracoid processes	18.1-24.6	20.9	1.9
Coracoid process length	13.8-17.4	15.0	1.2
Distance between cleithral processes	23.1-27.6	24.3	1.4
Cleithral process length	6.5-10.0	8.0	1.0
Pre-dorsal length	44.2-47.3	45.42	1.2
Pre-pelvic length	46.7-49.7	48.2	1.2
Pre-anal length	64.0-67.1	65.8	1.0
Anal-fin base length	15.2-20.0	17.5	1.4
Caudal-peduncle length	16.5-20.5	18.7	1.3
Caudal-peduncle depth	4.7-5.9	5.1	0.4
Caudal-fin width	5.4-7.3	6.3	0.6
Percent of HL			
Snout length	26.6-30.1	28.3	1.2
Eye diameter	9.0-12.9	10.9	1.1
Interorbital width	25.7-31.0	28.5	1.6
Maxillary-barbel length	103.9-129.7	116.6	8.1
Distance between anterior nares	13.3-18.1	15.7	1.4
Distance between posterior nares	27.4-32.8	30.1	1.5
Mouth width	32.6-42.7	38.6	3.2

is difficult, given the morphological similarities of the species within the genus. Cardoso (2010), in order to differentiate *Bunocephalus erondinae* from *B. doriae*, provided useful osteological information of the latter species, that can be used to distinguish this species from the remaining species of the genus.

The specimens herein studied could be identified as *Bunocephalus doriae* only after comparisons of x-ray photographs of its syntypes with C&S specimens and the osteological information provided by Cardoso (2010). This highlights the importance of detailed osteological descriptions, studies of comparative anatomy, and the need of a redescription of *B. doriae* considering the morphological variations across its wide area of distribution.

This contribution extends the distributional range of *Bunocephalus doriae* to the western-most locality from which this species has been recorded and represent another faunistic element shared between the Paraná River and Bermejo River basins. From this contribution, the distribution of *Bunocephalus doriae* appears to be disjunct, with the population of the upper Bermejo basin isolated from those of the Paraná–Paraguay rivers. However, the lower Bermejo River basin has not been as intensively sampled as other regions of the Paraná system, and especially the upper Bermejo River basin. Therefore, this disjunction probably is only an artifact produced by the lack of data.

Comparative material: *Bunocephalus doriae*, BMNH 1902.2.10.22-23, syntypes. CI-FML 2422, 1 ex., 69.5 mm SL, Paraná River, Villa Elisa, Colón, Entre Ríos, Argentina, 30°09'19.49" S, 058°10'51.82" W, March 1983. CI-FML 5421, 1 ex., 51.0 mm SL, Paraná River, Ituzaingó, Corrientes, Argentina, 27°35'08.02" S, 056°41'44.06" W, July 2012, Terán, Paz and Ruiz Monachesi.

ACKNOWLEDGEMENTS

The authors thank Tiago Carvalho for valuable comments on the identification of specimens. Fundación Miguel Lillo, FONCyT (PICT 2011-0992 and 2012-2683) and CONICET (PIP 0301) provided constant support. We thank James MacLaine (BMNH), who kindly sent us X-ray photographs of syntypes of *Bunocephalus doriae*. Secretaria de Ambiente of Salta, and especially Yanina Bonduri and Sebastian Musalen, facilitated the permission to collect fish.

LITERATURE CITED

- Almirón, A., J. Casciotta, L. Ciotek and P. Giorgis. 2015. Guía de los peces del Parque Nacional Pre-Delta. Buenos Aires: Administración de Parques Nacionales Ciudad Autónoma de Buenos Aires. 300 pp.
- Boulenger, G.A. 1902. Description of new fishes and reptiles discovered by D. F. Silvestri in South America. *Annals and Magazine of Natural History* 9(52): 284–288. doi: [10.1080/00222930208678587](https://doi.org/10.1080/00222930208678587)
- Cardoso, A.R. 2010. *Bunocephalus erondinae*, a new species of banjo catfish from southern Brazil (Siluriformes: Aspredinidae). *Neotropical Ichthyology* 8(3): 607–613. doi: [10.1590/S1679-62252010000300005](https://doi.org/10.1590/S1679-62252010000300005)
- Carvalho, T.P., A.R. Cardoso, J.P. Friel and R.E. Reis. 2015. Two new species of the banjo catfish *Bunocephalus* Kner (Siluriformes: Aspredinidae) from the upper and middle Rio São Francisco basins, Brazil. *Neotropical Ichthyology* 13(3): 499–512. doi: [10.1590/1982-0224-20140152](https://doi.org/10.1590/1982-0224-20140152)
- Eigenmann, C.H. and W.R. Allen. 1942. Fishes of western South America. I. The intercordilleran and Amazonian lowlands of Peru. II. The high pampas of Peru, Bolivia, and northern Chile. With a revision of the Peruvian Gymnotidae, and of the genus *Orestias*. Lexington: University of Kentucky. 494 pp.
- Friel, J.P. 2003. Family Aspredinidae; pp. 261–267, in: R.E. Reis, S.O. Kullander and C.J. Ferraris Jr. (eds.). Check List of the freshwater fishes of South and Central America. Porto Alegre: Edipucrs.
- Ferraris, C.J. Jr. 2007. Checklist of catfishes, recent and fossil (Osteichthyes: Siluriformes), and catalogue of siluriform primary types. *Zootaxa* 1418: 1–628. <http://mapress.com/zootaxa/2007f/zt01418p300.pdf>
- Hales, J. and P. Petry. 2015. Chaco in freshwater ecoregions of the world. Accessed at <http://www.feow.org/ecoregions/details/342>, 30 January 2016.
- Liotta, J. 2015. Base de datos de peces de aguas continentales de Argentina. Accessed at <http://www.pecesargentina.com.ar>, 30 February 2016.
- Mirande, J.M. and G. Aguilera. 2009. Los peces de la selva pedemontana del noroeste argentino; pp. 169–211, in: A. Brown, P.G. Blendinger, T. Lomáscolo and P. Garcia Bes (eds.). Selva Pedemontana de las Yungas. Historia natural, ecología y manejo de un ecosistema en Peligro. Yerba Buena Tucumán: Ediciones del Subtrópico. <http://proyungas.org.ar/wpcontent/uploads/2014/12/SelvaPedemontanadelasYungas.pdf>

Mirande, J.M. and S. Koerber. 2015. Checklist of the freshwater fishes of Argentina (CLOFFAR). Ichthyological Contributions of Peces Criollos 36: 1–68. http://media.hotelwebservice.com/media/pecescrillo/ics/icp_36_-_mirande_koerber_2015_cloffar.pdf

Serra, W.S., J. Bessonart, F. Teixeira de Mello, A. Duarte, L. Malabarba and M. Loureiro. 2014. Peces del Rio Negro. Montevideo: MGAP-DINARA. 208 pp. http://www.dinara.gub.uy/files/Publicaciones/Pesca/Guia_de_Peces_de_Rio_Negro.pdf

Author contributions: GA wrote the text and analyzed the specimens, GET took the measurements, FA made the map, and JMM compared the specimens with related species. All authors corrected the final version of the manuscript.

Received: 20 November 2015

Accepted: 6 April 2016

Academic editor: Marina Loeb